

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION**

THE TRUSTEES OF PURDUE UNIVERSITY,

Plaintiff,

vs.

STMICROELECTRONICS, N.V., AND
STMICROELECTRONICS, INC.

Defendants.

CASE No. 6:21-CV-00727-ADA

JURY TRIAL DEMANDED

**STMICROELECTRONICS, INC.’S ANSWER TO
THE TRUSTEES OF PURDUE UNIVERSITY’S COMPLAINT**

Defendant STMicroelectronics, Inc. (“ST Inc.”)¹ responds to The Trustees of Purdue University’s (“Purdue”) Complaint for Patent Infringement and Jury Demand as follows:

PARTIES

1. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 1, and therefore denies them.

2. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 2, and therefore denies them.

3. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 3, and therefore denies them.

4. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 4, and therefore denies them.

¹ Purdue improperly conflates both of the Defendant entities, defining them collectively as “ST.” STMicroelectronics, Inc. answers on behalf of itself only and no other entity.

5. Paragraph 5 contains Purdue's legal contentions to which no response is required. To the extent a response is required, STMicroelectronics, Inc. denies the allegations in paragraph 5, and specifically denies that Purdue may claim sovereign immunity from *inter partes* review, *ex parte* reexamination, or other post-grant proceeding at the United States Patent and Trademark Office. *See, e.g., Regents of the Univ. of Minn. v. LSI Corp.*, 926 F.3d 1327 (Fed. Cir. 2019).

6. The allegations in paragraph 6 are not directed to STMicroelectronics, Inc. and therefore require no response. To the extent a response is required, on information and belief, STMicroelectronics, Inc. admits that STMicroelectronics N.V. is organized under the laws of The Netherlands with a place of business at WTC Schiphol Airport, Schiphol Boulevard 265, 1118 BH Schiphol, The Netherlands, and denies any remaining allegations of paragraph 6.

7. Responding to the allegations in paragraph 7, STMicroelectronics, Inc. admits that it is an indirect wholly-owned subsidiary of STMicroelectronics N.V., is a corporation organized under the laws of the State of Delaware, with a place of business at 750 Canyon Drive, Suite 300, Coppell, Texas 75019, and may be served through its registered agent. On information and belief, ST denies any remaining allegations in paragraph 7.

JURISDICTION

8. Responding to the allegations in paragraph 8, STMicroelectronics, Inc. admits that Purdue's allegations purport to arise under the patent laws of the United States, and that this Court has subject matter jurisdiction over such claims.

9. Responding to the allegations in paragraph 9, STMicroelectronics, Inc. admits only that it is subject to personal jurisdiction in this Court for the purposes of Purdue's Complaint. STMicroelectronics, Inc. denies the remaining allegations in paragraph 9. STMicroelectronics, Inc. specifically denies that it infringes the Patents-in-Suit.

10. Responding to the allegations in paragraph 10, STMicroelectronics, Inc. admits only that it conducts business in the United States, the State of Texas, and this District. STMicroelectronics, Inc. denies the remaining allegations in paragraph 10.

11. Responding to the allegations in paragraph 11, STMicroelectronics, Inc. admits only that it has transacted business in this District and that it is subject to personal jurisdiction in this Court for the purposes of Purdue's Complaint. STMicroelectronics, Inc. denies the remaining allegations in paragraph 11. STMicroelectronics, Inc. specifically denies that it infringes the Patents-in-Suit.

12. The allegations in paragraph 12 are not directed to STMicroelectronics, Inc. and therefore require no response. To the extent a response is required, STMicroelectronics, Inc. admits only that STMicroelectronics N.V. is a foreign entity and that Purdue's claims for patent infringement arise under U.S. federal law. STMicroelectronics, Inc. denies the remaining allegations in paragraph 12.

13. Paragraph 13 contains legal conclusions to which no response is required. To the extent a response is required, STMicroelectronics, Inc. admits only that it is subject to personal jurisdiction in this Court for the purposes of Purdue's Complaint. STMicroelectronics, Inc. denies any remaining allegations in paragraph 13.

VENUE

14. Responding to the allegations in paragraph 14, STMicroelectronics, Inc. admits only that venue over it is proper in this District, but not that it is convenient. STMicroelectronics, Inc. admits that it has transacted business in this District and that it has an office at 8501 N. Mo-Pac Expressway, Suite 420, Austin, Texas 78759. STMicroelectronics, Inc. denies the remaining allegations in paragraph 14. STMicroelectronics, Inc. specifically denies that it directly or indirectly infringes the Patents-in-Suit.

15. Responding to the allegations in paragraph 15, STMicroelectronics, Inc. admits that it is and has been registered to do business in the State of Texas since August 4, 1983. STMicroelectronics, Inc. denies any remaining allegations in paragraph 15.

16. The allegations in paragraph 16 are not directed to STMicroelectronics, Inc. and contain legal conclusions to which no response is required. To the extent a response is required, STMicroelectronics, Inc. denies the allegations in paragraph 16.

17. Paragraph 17 contains Purdue's legal contentions to which no response is required. To the extent a response is required, STMicroelectronics, Inc. denies the allegations in paragraph 17, and specifically denies that Purdue may claim sovereign immunity from administrative tribunals, such as *inter partes* review, *ex parte* reexamination, or other post-grant proceeding at the United States Patent and Trademark Office. *See, e.g., Regents of the Univ. of Minn. v. LSI Corp.*, 926 F.3d 1327 (Fed. Cir. 2019).

U.S. PATENT NO. 7,498,633

18. Responding to the allegations in paragraph 18, STMicroelectronics, Inc. admits that Exhibit A to Purdue's Complaint (ECF No. 1) and the document located at <https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=7498633> purport to be a copy of the '633 Patent, which bears the title "High-Voltage Power Semiconductor Device" and an issue date of March 3, 2009. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the remaining allegations in paragraph 18, and therefore denies them.

19. STMicroelectronics, Inc. admits that only that first page of the '633 Patent states that it issued from U.S. Patent Application No. 11/338,007, which the '633 Patent states was filed on January 23, 2006, and that the '633 Patent claims priority to U.S. Provisional Application No. 60/646,152, which the '633 Patent states was filed on January 21, 2005.

STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the remaining allegations in paragraph 19, and therefore denies them.

20. Responding to the allegations in paragraph 20, STMicroelectronics, Inc. denies that the purported inventions claimed in the '633 Patent are useful, novel, and non-obvious. STMicroelectronics, Inc. specifically denies the asserted claims of the '633 Patent are valid. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of any remaining allegations in paragraph 20, and therefore denies them.

21. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 21, and therefore denies them.

22. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 22, and therefore denies them.

23. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations paragraph 23, and therefore denies them.

24. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations paragraph 24, and therefore denies them.

25. STMicroelectronics, Inc. denies the allegations in paragraph 25.

26. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations paragraph 26, and therefore denies them.

27. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations paragraph 27, and therefore denies them.

U.S. PATENT NO. 8,035,112

28. Responding to the allegations in paragraph 28, STMicroelectronics, Inc. admits that Exhibit B to Purdue's Complaint (ECF No. 1) and the document located at <https://pdfpiw.uspto.gov/.piw?PageNum=0&docid=8035112> purport to be a copy of the '112

Patent, which bears the title “SIC Power DMOSFET with Self-aligned Source Contact” and an issue date of October 11, 2011. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the remaining allegations in paragraph 28, and therefore denies them.

29. STMicroelectronics, Inc. admits that only that first page of the ’112 Patent states that it issued from U.S. Patent Application No. 12/429,176, which the ’112 Patent states was filed on April 23, 2009, and that the ’112 Patent claims priority to U.S. Provisional Application No. 61/047,274, which the ’112 Patent states was filed on April 23, 2008. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the remaining allegations in paragraph 29, and therefore denies them.

30. Responding to the allegations in paragraph 30, STMicroelectronics, Inc. denies that the purported inventions claimed in the ’112 Patent are useful, novel, and non-obvious. STMicroelectronics, Inc. specifically denies the asserted claims of the ’112 Patent are valid. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of any remaining allegations in paragraph 30, and therefore denies them.

31. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 31, and therefore denies them.

32. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 32, and therefore denies them.

33. STMicroelectronics, Inc. denies the allegations in paragraph 33.

34. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations paragraph 34, and therefore denies them.

35. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations paragraph 35, and therefore denies them.

COUNT I: ALLEGED INFRINGEMENT OF THE '633 PATENT

36. STMicroelectronics, Inc. denies the allegations in paragraph 36. STMicroelectronics, Inc. specifically denies that it directly, indirectly, or willfully infringes the '633 Patent.

37. STMicroelectronics, Inc. denies the allegations in paragraph 37.

38. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 38, and therefore denies them.

39. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 39, and therefore denies them.

40. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 40, and therefore denies them.

41. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 41, and therefore denies them.

42. STMicroelectronics, Inc. incorporates by reference its responses to the foregoing paragraphs. STMicroelectronics, Inc. denies the remaining allegations in paragraph 42. STMicroelectronics, Inc. specifically denies that it infringes the '633 Patent.

43. STMicroelectronics, Inc. denies the allegations in paragraph 43.

STMicroelectronics, Inc. specifically denies that it directly or indirectly infringes the '633 Patent.

44. STMicroelectronics, Inc. denies the allegations in paragraph 44.

STMicroelectronics, Inc. specifically denies that it directly or indirectly infringes the '633 Patent.

45. STMicroelectronics, Inc. denies the allegations in paragraph 45.

STMicroelectronics, Inc. specifically denies that it directly or indirectly infringes the '633 Patent.

46. STMicroelectronics, Inc. denies the allegations in paragraph 46.

STMicroelectronics, Inc. specifically denies that it directly, indirectly, or willfully infringes the '633 Patent.

47. STMicroelectronics, Inc. denies the allegations in paragraph 47.

STMicroelectronics, Inc. specifically denies that it directly, indirectly, or willfully infringes the '633 Patent.

COUNT II: ALLEGED INFRINGEMENT OF THE '112 PATENT

48. STMicroelectronics, Inc. denies the allegations in paragraph 48.

STMicroelectronics, Inc. specifically denies that it directly, indirectly, or willfully infringes the '112 Patent.

49. STMicroelectronics, Inc. denies the allegations in paragraph 49.

50. STMicroelectronics, Inc. admits only that the devices Purdue has listed as Accused Products in paragraph 37, namely the SCT1000N170AG, SCT20N170AG, SCTWA35N65G2VAG, SCTH100N65G2-7AG, SCTH35N65G2V-7, SCTH35N65G2V-7AG, SCTH90N65G2V-7, SCTW100N65G2AG, SCTW35N65G2V, SCTW35N65G2VAG, SCTW90N65G2V, SCTWA35N65G2V, and SCTWA90N65G2V, are MOSFETs.

STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the remaining allegations in paragraph 50, and therefore denies them.

51. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 51, and therefore denies them.

52. STMicroelectronics, Inc. lacks sufficient knowledge or information to form a belief as to the truth of the allegations in paragraph 52, and therefore denies them.

53. STMicroelectronics, Inc. incorporates by reference its responses to the foregoing paragraphs. STMicroelectronics, Inc. denies the remaining allegations in paragraph 53. STMicroelectronics, Inc. specifically denies that it infringes the '112 Patent.

54. STMicroelectronics, Inc. denies the allegations in paragraph 54. STMicroelectronics, Inc. specifically denies that it directly or indirectly infringes the '112 Patent.

55. STMicroelectronics, Inc. denies the allegations in paragraph 55. STMicroelectronics, Inc. specifically denies that it directly or indirectly infringes the '112 Patent.

56. STMicroelectronics, Inc. denies the allegations in paragraph 56. STMicroelectronics, Inc. specifically denies that it directly or indirectly infringes the '112 Patent.

57. STMicroelectronics, Inc. denies the allegations in paragraph 57. STMicroelectronics, Inc. specifically denies that it directly, indirectly, or willfully infringes the '112 Patent.

58. STMicroelectronics, Inc. denies the allegations in paragraph 58. STMicroelectronics, Inc. specifically denies that it directly, indirectly, or willfully infringes the '112 Patent.

RESPONSE TO DEMAND FOR JURY TRIAL

59. STMicroelectronics, Inc. requests a trial by jury on all issues so triable.

RESPONSE TO PRAYER FOR RELIEF

60. To the extent that a response to Purdue's Prayer for Relief is appropriate, STMicroelectronics, Inc. denies that Purdue is entitled to any requested relief.

AFFIRMATIVE DEFENSES

61. STMicroelectronics, Inc. alleges and asserts the following defenses in response to the allegations in Purdue's Complaint. STMicroelectronics, Inc. reserves the right to rely on any other defense that may become available or known throughout the course of discovery in this case, and reserves the right to amend this Answer to assert any such defense. Assertion of a defense is not a concession that STMicroelectronics, Inc. has the burden of proving the matter asserted.

FIRST DEFENSE
(Noninfringement)

62. Purdue's claims are barred, in whole or in part, because STMicroelectronics, Inc. does not infringe and has not infringed, directly or indirectly, literally or under the doctrine of equivalents, any valid and enforceable claim of the Patents-in-Suit as required by 35 U.S.C. § 271.

SECOND DEFENSE
(Invalidity)

63. Each asserted claim of the Patents-in-Suit is invalid for failure to comply with one or more of the requirements of Title 35, United States Code, including, without limitation, 35 U.S.C. §§ 101, 102, 103, 112, and/or 116, the non-statutory doctrine of double patenting, incorrect inventorship, and the rules, regulations, and laws pertaining thereto.

THIRD DEFENSE
(Limitation on Damages)

64. Purdue's claims for damages are statutorily limited or barred by 35 U.S.C. § 286.

FOURTH DEFENSE
(Prosecution History Estoppel)

65. Purdue is estopped from construing any valid claim of the Patents-in-Suit to cover or include, either literally or by application of the doctrine of equivalents, any product or service made, used, sold, offered for sale or imported by STMicroelectronics, Inc. because of admissions and statements made to the United States Patent and Trademark Office (“PTO”) during prosecution of the applications leading to the issuance of the Patents-in-Suit.

FIFTH DEFENSE
(License/Exhaustion)

66. To the extent that any manufacture, use, sale, offer for sale, or importation into the United States of the Accused Products, any component thereof, or any products in which the component is integrated were authorized by Purdue or any of its successors in interest, Purdue’s claims are precluded under the doctrine of implied or express license, or by the doctrine of patent exhaustion.

SIXTH DEFENSE
(Failure to Mark)

67. To the extent that Purdue, its alleged predecessors in interest to the Patents-in-Suit, and any and all licensees of the Patents-in-Suit failed to properly mark any of their relevant products as required by 35 U.S.C. § 287 or otherwise give proper notice that STMicroelectronics, Inc.’s actions allegedly infringed the Patents-in-Suit, STMicroelectronics, Inc. is not liable to Purdue for the acts alleged to have been performed before receiving actual notice that it was allegedly infringing the Patents-in-Suit.

SEVENTH DEFENSE
(Inequitable Conduct)

68. All of the claims of the '633 and '112 Patents are unenforceable due to inequitable conduct.

69. Purdue claims that the '633 Patent was duly and legally issued by the PTO on March 3, 2009, and purports to relate “to useful, novel, and non-obvious semiconductor devices for high-voltage power applications.” Further, by virtue of its infringement allegations, Purdue implies that the '633 Patent is enforceable.

70. Purdue claims that the '112 Patent was duly and legally issued on October 11, 2011, by the PTO and purports to relate “to useful, novel, and non-obvious field effect transistors having self-aligned source contacts.” Further, by virtue of its infringement allegations, Purdue implies that the '112 Patent is enforceable.

71. STMicroelectronics, Inc. denies the enforceability of the '633 and '112 Patents and alleges that all of the claims of the '633 and '112 Patents are unenforceable due to inequitable conduct.

72. Specifically, on information and belief and subject to STMicroelectronics, Inc.’s continuing investigations and discovery, the named inventors and/or their representatives failed to disclose material information and made affirmatively misleading and/or false statements to the PTO during prosecution of the '633 and '112 Patents.

73. The '633 Patent issued from U.S. Patent Application No. 11/338,007 (“the '007 Application”), which was filed on January 23, 2006.

74. The '112 Patent issued from U.S. Patent Application No. 12/429,176 (“the '176 Application”), which was filed on April 23, 2009.

75. The named inventors on both the '007 and '176 Applications were James A. Cooper, Ph.D. and Asmita Saha, Ph.D. Both applications were assigned to Purdue Research Foundation of West Lafayette, Indiana (the named inventors and Purdue Research Foundation are collectively referred to herein as the “Patentees”).

76. On information and belief, the Purdue Research Foundation is a private, nonprofit foundation “created to advance the mission of Purdue University” and “protect[] Purdue’s intellectual property.”²

77. The attorneys prosecuting the '007 Application on behalf of Purdue Research and the named inventors were Bradford G. Addison and Glen M. Kellett of Barnes & Thornburg LLP. The attorneys prosecuting the '176 Application on behalf of Purdue Research and the named inventors were William F. Bahret and R. Randall Frisk of Bahret & Associates LLC.

78. Each individual associated with the filing and prosecution of a patent application has an absolute duty of candor and good faith in dealing with the PTO. 37 C.F.R. § 1.56. This duty includes the duty to disclose information that is material to patentability. A breach of this duty may constitute inequitable conduct, or “fraud on the Patent Office,” rendering the patent unenforceable.

79. Each of the named-inventors of the '633 and '112 Patents signed declarations under oath acknowledging their duty of candor and acknowledging that willful false statements may jeopardize the validity of the applications or any patents issued thereon.

² About PRF, Purdue Research Foundation, <https://prf.org/about/index.html> (last visited Sept. 29, 2021).

80. The written description in the application leading to the issuance of the '633 Patent stated that the purported invention "relates generally to semiconductor devices, and more particularly to semiconductor devices for high-voltage power applications."

81. During prosecution of the '633 Patent, the Patentees knew of specific prior art disclosures, knowledge of a person of ordinary skill in the art ("PHOSITA"), and their specific materiality to one or more aspects of the claimed inventions and/or the reasons for allowance. The Patentees, however, did not disclose these material references and also misrepresented the PHOSITA's knowledge to the Examiner.

82. As one example, at least Dr. Cooper is a prolific writer who has authored or co-authored numerous technical publications, including, at one point, reportedly over 250 technical papers and conference presentations, five book chapters, 18 U.S. patents, and a textbook on silicon carbide (SiC) technology.³

83. More specifically, prior to the application for the '633 Patent, Dr. Cooper had authored or co-authored numerous articles, papers, and reports relating to design and manufacture of silicon-carbide semiconductor devices.

84. On information and belief and subject to STMicroelectronics, Inc.'s continuing investigation and discovery, Dr. Cooper and the Patentees were aware of other articles on SiC semiconductor devices before and during prosecution of the '633 Patent.

85. However, Dr. Cooper and the Patentees did not disclose any prior art (e.g., any patents, patent applications, articles, publications, etc.) to the Examiner in connection with the

³ Dr. James A. Cooper, Real Engineers Get their Hands Dirty, Purdue University, College of Engineering – Academic Affairs, <https://engineering.purdue.edu/Engr/AboutUs/Administration/AcademicAffairs/Events/Colloquia/cooper> (last visited Sept. 29, 2021).

prosecution of the '633 Patent, even though such references were material to the claims being prosecuted.

86. On October 12, 2007, during prosecution of the '633 Patent, the Examiner issued a Final Rejection rejecting claims 1, 3, 4, 7–10, 12, and 13 under 35 U.S.C. § 103(a) as being unpatentable over Ono (U.S. Patent Application Pub. No. 2003/0227052) in view of Kumar (U.S. Patent No. 6,573,534) and further in view of Zeng (U.S. Patent No. 6,137,139). The Examiner explained as follows:

As to claims 1, 3, 4, 9, 12, and 13, Ono discloses and shows (Fig 1), a double implanted MOS field effect transistor comprising a semiconductor substrate (10) having a first concentration of first type impurities (n+); a drift semiconductor layer (50) formed on a front side of the semiconductor substrate and having a second concentration of first type impurities less than the first concentration of first type impurities (n-); a first source region (20); a second source region (20); and a JFET region (40) defined between the first source region and the second source region, the JFET region having a third concentration of first type impurities that is greater than the second concentration of first type impurities (n) and having a width (L) less than about 3 micrometers and a width of about one micrometer. (Paragraphs [0039] & [0041]).

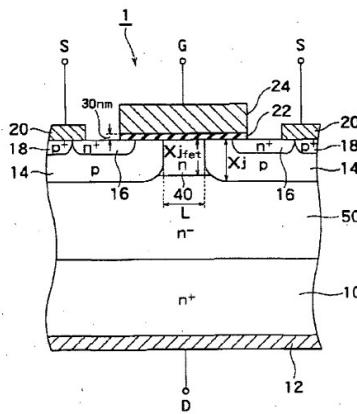


FIG. 1

Ono does not disclose that the semiconductor substrate is a silicon-carbide substrate.

Kumar is related to a similar MOS FET structure and discloses that the substrate is a silicon-carbide substrate (Column 1, line 40).

Kumar is evidence that a person of ordinary skill in the art would find a reason, suggestion or motivation to use a silicon-carbide substrate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ono by using a silicon-carbide substrate for advantages such as higher breakdown voltage and lower ON resistance according to the teachings of Kumar (Column 1, lines 27-30).

87. On March 12, 2008, the Patentees responded to the October 12, 2007 Final

Rejection and argued as follows:

Applicants respectfully traverse these rejections. As discussed in detail below, Applicants believe that no rational reason exists why one of ordinary skill in the art would combine Ono, Kumar, and Zeng in the manner described. Applicants assert that no such reason exists because the proposed combination would render the device of Ono unsatisfactory or inoperable for its intended purpose. Thus, Ono, Kumar, and Zeng teach away from the proposed combination and cannot support a finding of obviousness.

I. References Teach Away from Proposed Combination

Applicants assert that no rational reason exists to combine Ono, Kumar, and Zeng in the manner described by the Examiner because the cited references teach away from the proposed combination.

...

The semiconductor device of Ono would be rendered [sic] unsatisfactory or inoperable for its intended purpose if modified to include the structures of Zeng and Kumar as proposed by the Examiner. As noted by the Examiner, Ono and Zeng are directed toward MOSFET devices having silicon substrates, while Kumar is directed toward silicon-carbide MOSFET devices. Although the Examiner asserts that modifying Ono to include a silicon-carbide is an obvious modification, such an assertion ignores the technical aspects of silicon-carbide MOSFET devices.

88. The Patentees made a material misrepresentation during prosecution of the '633 Patent by stating, for example, that it would not be obvious to modify the silicon substrate devices disclosed in the cited references to include those structures in silicon-carbide. At the time Patentees made these misrepresentations to the Examiner, however, the Patentees (including Dr. Cooper, in particular) were aware of prior art publications disclosing very similar structures in silicon-carbide. But the Patentees did not disclose such material prior art or information to the examiner.

89. As one example, in April 2002, nearly six years before the Patentees responded to the Examiner's rejection, Dr. Cooper authored an IEEE paper entitled "Status and Prospects for SiC Power MOSFETs" (the "Cooper IEEE Paper") in which he discussed similar silicon-carbide structures.⁴ Neither Dr. Cooper nor the other Patentees disclosed the Cooper IEEE Paper to the PTO in connection with the prosecution of the '633 Patent.

90. On information and belief, several of Dr. Cooper's other prior art publications disclose similar structures in silicon-carbide to those that were at issue during prosecution of the '633 Patent.

91. The Patentees not only withheld material prior art such as the Cooper IEEE Paper from the Examiner but also falsely told the Examiner that the proposed combined structures in silicon-carbide were nonobvious during prosecution of the '633 Patent.

92. Had the Patentees disclosed the material prior art references that they were aware of (such as the Cooper IEEE Paper) to the PTO during the prosecution of the '633 Patent, the claims would not have issued.

⁴ See, e.g., James A. Cooper et al., Status and Prospects for SiC Power MOSFETs, 49 IEEE Transactions on Electron Devices, No. 4, 658, 658–61 & Figs. 1–4 (Apr. 2002).

93. In addition, Patentees' misrepresentations regarding similar structures in silicon-carbide, as well as the nondisclosure of prior art like the Cooper IEEE Paper, were a breach of the duty of candor and good faith because at least Dr. Cooper knew that such information was material to the application that ultimately issued as the '633 Patent.

94. On information and belief, at least Patentees' material misrepresentations and failure to disclose material prior art such as the Cooper IEEE paper to the PTO during prosecution of the '633 Patent were done with specific intent to deceive the PTO in order to obtain issuance of the '633 Patent.

95. The written description in the application leading to the issuance of the '112 Patent stated that the purported invention "relates generally to semiconductor field effect transistors, and more particularly to field effect transistors having self-aligned source contacts."

96. During prosecution of the '112 Patent, the Patentees knew of specific prior art disclosures, knowledge of a PHOSITA, and their specific materiality to one or more aspects of the claimed inventions and/or the reasons for allowance. The Patentees, however, did not disclose these material references and also misrepresented the PHOSITA's knowledge to the Examiner.

97. As one example, when the application for the '112 Patent was filed and throughout prosecution, the Patentees were aware of relevant, material prior art that they did not disclose. For example, in the Complaint, Purdue alleges that Dr. Cooper is a professor of electrical and computer engineering at Purdue University and that Dr. Saha was Dr. Cooper's doctoral student. On information and belief, Dr. Saha authored a thesis entitled "SiC Short Channel Power DMOSFET: An Optimized Design" (the "Saha Thesis"), which Dr. Saha

submitted to the Purdue faculty in December 2006 in partial fulfillment of the requirements for her Ph.D.

98. Significantly, Dr. Cooper is identified as the “Major Professor” on the face of the Saha Thesis. On information and belief, as Dr. Saha’s Major Professor, Dr. Cooper chaired Dr. Saha’s Doctoral Advisory Committee, assisted in the preparation of Dr. Saha’s final plan of study, and advised Dr. Saha on her thesis research.⁵ On information and belief, Dr. Cooper reviewed the Saha Thesis at least in connection with Dr. Saha’s preliminary and final doctoral examinations.

99. The Saha Thesis teaches much of the same subject matter that was later claimed in the ’112 Patent. In addition, the Saha Thesis discloses key features of the ’112 Patent’s claims, including, for example, key features of issued claim 6. Claim 6 recites:

6. A MOSFET structure, comprising:

a silicon carbide wafer having a substrate body with an upper surface, said substrate body having at least one source region formed adjacent said upper surface;

a substrate surface oxidation layer on said upper surface of said substrate body and adjacent said source region;

at least two polysilicon gates above said substrate surface oxidation layer, said gates each having a top, a bottom and sides, wherein a first source region of said at least one source region is juxtaposed between first and second adjacent gates of said at least two polysilicon gates;

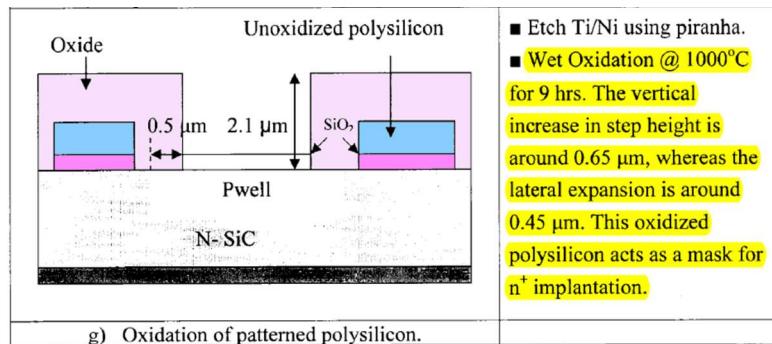
a gate oxide layer, thicker than said substrate surface oxidation layer, over said tops and sides of each of said gates;

⁵ PhD Program Handbook, Elmore Family School of Electrical and Computer Engineering, Purdue University, <https://engineering.purdue.edu/ECE/Academics/Graduates/PHD/handbook> (last visited Sept. 29, 2021).

and a material layer over said first source region and between said gate oxide layers on said sides of said gates, said material layer comprising one of an oxide and a metal contact.

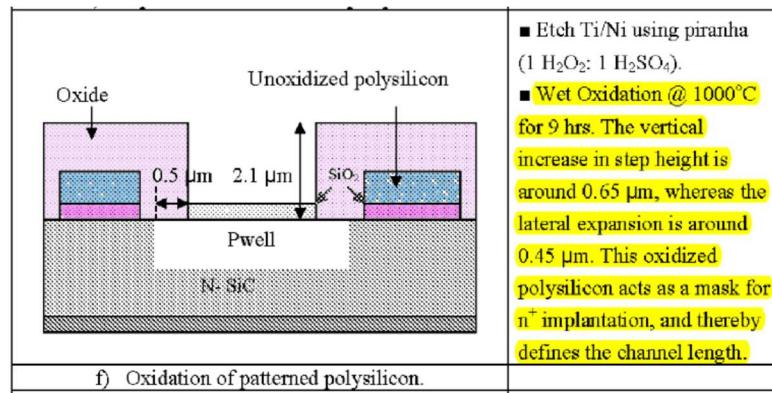
100. As one example, the Saha Thesis discloses a gate oxide layer as recited in claim 6.

As shown below, Figure 2.5(g) of the Saha Thesis discloses that wet oxidation of poly gate forms “gate oxide” that covers both the top and sides of the gate:



Saha Thesis, at p. 22

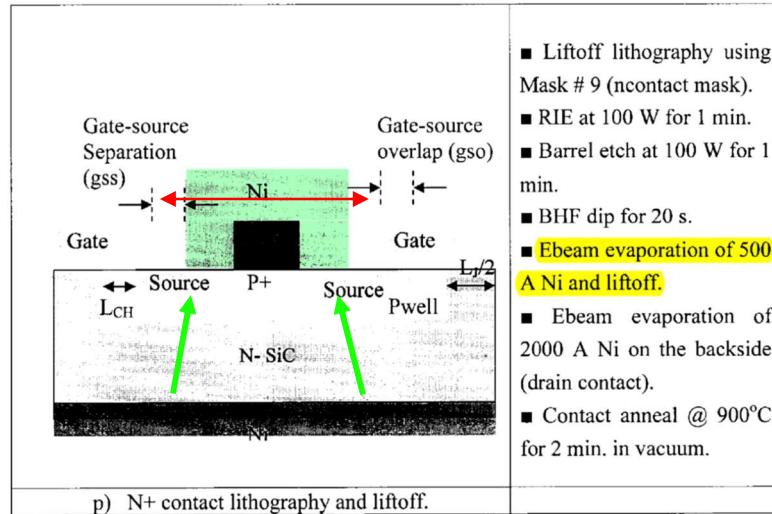
101. The figure above from the Saha Thesis and accompanying description are nearly identical to Figure (f) from Appendix I of the '112 Patent:



'112 Patent Certificate of Correction, at p. 3 of 12

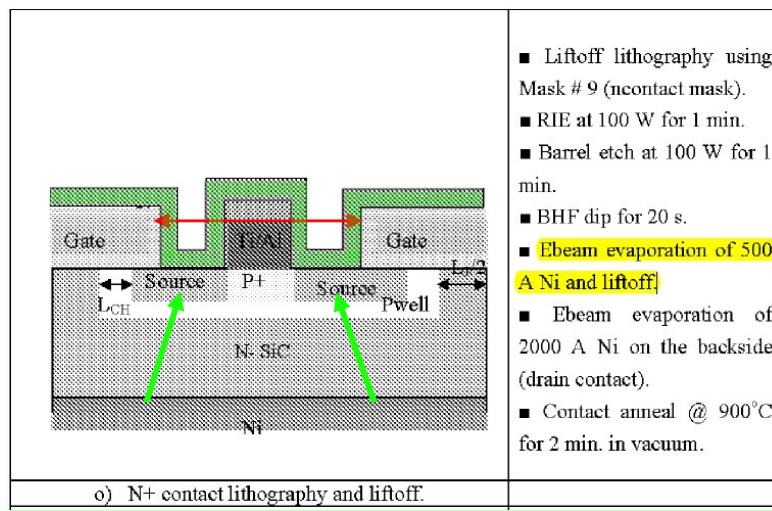
102. As another example, the Saha Thesis discloses “a material layer over said first source region [and between said gate oxide layers on said sides of said gates a gate oxide layer,” as recited in claim 6. As shown below, at least Figure 2.5(p) of the Saha Thesis discloses “a

material layer over said first source region” (annotated in green) that is “between said gate oxide layers on said sides of said gates a gate oxide layer” (annotated in red):



Saha Thesis, at p. 26

103. The figure above from the Saha Thesis and accompanying description are nearly identical to Figure (o) from Appendix I of the '112 Patent:



'112 Patent Certificate of Correction, at p. 6 of 12

104. On information and belief, the Saha Thesis was authored by Dr. Saha, reviewed by Dr. Cooper, and distributed to Purdue faculty no later than December 2006, almost five years

before the '112 Patent issued on October 11, 2011. In addition, on information and belief, the Saha Thesis was published by ProQuest Information and Learning Company no later than 2007.

105. Yet neither Dr. Saha, nor Dr. Cooper, nor anyone else associated with the filing and prosecution of the patent disclosed the Saha Thesis to the PTO in connection with the prosecution of the '112 Patent.

106. The nondisclosure of the Saha Thesis was a breach of the duty of candor and good faith because at least Dr. Saha, Dr. Cooper, and likely others associated with the filing and prosecution of the patent knew about the prior art publication and knew that it was material to the application that ultimately issued as the '112 Patent.

107. The Saha Thesis is material to the patentability of the '112 Patent because it anticipates and/or renders obvious certain of its claims, including at least claim 6. Had the Saha Thesis and the other material prior art references known to the Patentees been before the Examiner, the '112 Patent would not have issued due to lack of novelty and/or obviousness.

108. On information and belief, at least Dr. Saha, Dr. Cooper, and others associated with the filing and prosecution of the patent failed to disclose the Saha Thesis to the PTO during prosecution of the '112 Patent with specific intent to deceive the PTO in order to obtain issuance of the '112 Patent.

109. As another example of inequitable conduct, the Patentees knowingly made false statements to the Examiner during prosecution of the '112 Patent.

110. On February 23, 2011, the Examiner rejected application claims 4 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Miura (U.S. patent No. 7,622,741). The Examiner explained:

Regarding claims 4 and 6, Miura discloses a silicon carbide MOSFET structure, comprising:

a silicon carbide wafer (1) having a substrate body having a source region (4) formed adjacent an upper surface thereof;

first (5a) and second oxide layers (5b) on the upper surface adjacent the source region (4);

a plurality of gate (6a/6b) above each of the first (5a) and second oxide layers (5b);

a plurality of gate oxide layers (7), thicker than the first (5a) and second oxide layers (5b) beneath the gates, over each of the gates and the sides thereof;

a source electrode (8) over the source region, extending between adjacent gate oxide layers (7) (Fig. 1).

Miura discloses the features of the claimed invention as discussed above, but does not disclose a plurality of gates are made of polysilicon and the source electrode is made of metal.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form a plurality of gates are made of polysilicon and the source electrode is made of metal to improve the silicon carbide MOSFET structure, since it has been held within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

111. On May 23, 2011, in response to the Examiner's rejection, Patentees represented to the Examiner as follows:

There is no disclosure, teaching or suggestion in Miura as to what the composition of the gates should be, and the examiner has provided no reason with a rational underpinning to explain why a person of ordinary skill in the art would form the gates of polysilicon.

...

It should be noted here that, in addition to Miura not disclosing a polysilicon gate or metal electrode, Miura also does not disclose the 'a gate oxide layer . . . over each of said gates,' as recited in claim 4. Miura instead discloses only an 'inter-layer insulation film 7, and nowhere teaches or suggests the composition of such film 7. Thus, Miura does not disclose the composition of the gates or the

insulation film, nor does Miura provide any teaching or suggestion what either the gates or insulation film should be made of or what factors would guide such decisions.

...

It is respectfully submitted that the examiner's rejection fails to articulate sufficient reasoning with some rational underpinning to explain why a person of ordinary skill would create gates made of polysilicon and first and second oxide layers therebelow in connection with the MOSFET with a SiC substrate and metal electrode, as recited in claim 4.

For the foregoing reasons, Applicant respectfully submits that the inventions of independent claim 4 and of claim 6 depending therefrom are patentable over Miura.

112. The Patentees made material misrepresentations during prosecution of the '633 Patent and breached their duty of candor and good faith in dealing with the PTO by, for example, suggesting that a PHOSITA would not create gates made of polysilicon or use an oxide as the insulator of choice over each of said gates.

113. At the time Patentees made these misrepresentations to the Examiner distinguishing Miura, the Patentees (including Dr. Cooper, in particular) knew that a PHOSITA could and would, for example, form gates of polysilicon. For example, in April 2002, over nine years before responding to the Examiner's rejection, Dr. Cooper authored the Cooper IEEE Paper in which he discussed polysilicon gates.⁶

114. In addition, by March 2003, Dr. Cooper knew that "a gate oxide layer . . . over each of said gates," as recited in application claim 4, would have been within the general skill of a person of ordinary skill in the art. For example, by March 2003, Dr. Cooper authored a report for the Office of Naval Research entitled "Development of SiC Power MOSFETs with Low On-

⁶ See, e.g., James A. Cooper et al., Status and Prospects for SiC Power MOSFETs, 49 IEEE Transactions on Electron Devices, No. 4, 658, 659 (Apr. 2002).

Resistance for Military and Commercial Applications" (the "Cooper Navy Report") in which Dr. Cooper discussed such a gate oxide layer.

115. Dr. Cooper did not disclose the Cooper Navy Report to the PTO in connection with the prosecution of the '112 Patent.

116. The misrepresentations regarding polysilicon gates and gate oxide layers, as well as the nondisclosure of the Cooper Navy Report, were a breach of the duty of candor and good faith because at least Dr. Cooper knew that such information was material to the application that ultimately issued as the '112 Patent.

117. In response to the Patentees' arguments, the Examiner allowed application claims 4 and 6, which issued as claims 2 and 4 of the '112 Patent. Had accurate representations and/or the Cooper Navy Report been before the Examiner, the '112 Patent would not have issued due to lack of novelty and/or obviousness.

118. On information and belief, at least Patentees' material misrepresentations and failure to disclose material prior art such as the Cooper Navy Report to the PTO during prosecution of the '112 Patent were done with specific intent to deceive the PTO in order to obtain issuance of the '112 Patent.

119. As described above, the Patentees' misrepresentations and failures to disclose known references in spite of the clear materiality of the same to the claims of the applications for the '633 and/or '112 Patent were violations of the duty of candor and good faith in dealing with the PTO. 37 C.F.R. § 1.56 and breach of the oath taken acknowledging their duty of candor.

120. As described above, on information and belief, Patentees' material misrepresentations and failures to disclose material prior art and information to the PTO during

prosecution of the '633 and '112 Patents were done with specific intent to deceive the PTO in order to obtain issuance of the '633 and '112 Patents.

121. On information and belief, at a minimum, Patentees' material misrepresentations and failures to disclose material prior art and information known to the Patentees that would have been relevant to the Examiner during prosecution of the '633 and '112 Patents constitute affirmative egregious misconduct.

122. Based at least on the foregoing, Purdue's claims against STMicroelectronics, Inc. are barred, in whole or in part, due to the Patentees' inequitable conduct during the prosecution of at least the '633 and '112 Patents.

EIGHTH DEFENSE
(Failure to State a Claim)

123. Purdue's Complaint fails to state a claim upon which relief can be granted.

NINTH DEFENSE
(Lack of Standing)

124. The Trustees of Purdue University lacks standing to assert infringement of the '633 and '112 Patents because it did not have sufficient rights in those patents at the time the suit was filed.

COUNTERCLAIMS

Defendant and Counterclaim-Plaintiff STMicroelectronics, Inc., for its counterclaims against Plaintiff and Counterclaim-Defendant Purdue, states as follows:

NATURE OF THE ACTION

125. This is an action by Defendant and Counterclaim-Plaintiff STMicroelectronics, Inc. pursuant to Rule 13 of the Federal Rules of Civil Procedure for declarations of non-

infringement and invalidity of U.S. Patent No. 7,498,633 (“the ’633 Patent”) and U.S. Patent No. 8,035,112 (“the ’112 Patent”) (collectively referred to as the “Patents-in-Suit”).

PARTIES

126. STMicroelectronics, Inc. is a Delaware corporation with its principal place of business at 750 Canyon Drive, Suite 300, Coppell, Texas 75019.

127. On information and belief, based on paragraph 1 of the Complaint as pleaded by Plaintiff and Counterclaim-Defendant Purdue, Purdue is a statutory body corporate that operates and conducts a state educational institution having its principal place of business at 610 Purdue Mall, West Lafayette, Indiana 47907.

JURISDICTION AND VENUE

128. These Counterclaims arise under the United States patent laws, 35 U.S.C. §§ 1, et seq., and seek relief for which this Court has jurisdiction pursuant to the Declaratory Judgment Act, 28 U.S.C. §§ 2201 and 2202. This Court has subject matter jurisdiction over these Counterclaims pursuant to 28 U.S.C. §§ 1331 and 1338(a).

129. This Court has personal jurisdiction over Purdue by virtue of its sufficient minimum contacts with this forum at least as a result of the filing of its case against STMicroelectronics, Inc. in this jurisdiction.

130. By filing in this District, Purdue has consented that venue for these Counterclaims is proper in this District under 28 U.S.C. § 1400(b).

131. An actual, substantial, and continuing justiciable controversy exists between Purdue and STMicroelectronics, Inc. based at least on Purdue filing a complaint against STMicroelectronics, Inc. alleging infringement of the Patents-in-Suit, with respect to which STMicroelectronics, Inc. requires a declaration of its rights by this Court. Specifically, the

controversy concerns the noninfringement and invalidity of the Patents-in-Suit and Purdue's right to maintain suit for alleged infringement of the Patents-in-Suit.

FIRST COUNTERCLAIM
(Declaration of Noninfringement of the '633 Patent)

132. STMicorelectronics, Inc. re-alleges and incorporates by reference the allegations set forth in paragraphs 125-131 of these Counterclaims.

133. Purdue claims that the '633 Patent was issued on March 3, 2009, by the PTO. Purdue claims ownership by assignment of the '633 Patent.

134. Purdue has alleged that STMicorelectronics, Inc. has infringed, and continues to infringe, the '633 Patent. An actual, immediate, and justiciable controversy exists between Purdue and STMicorelectronics, Inc. over the alleged infringement of the '633 Patent.

135. STMicorelectronics, Inc. has not infringed and does not infringe, directly or indirectly, willfully or otherwise, any valid and enforceable asserted claim of the '633 Patent, either literally or under the doctrine of equivalents.

136. A judicial declaration that STMicorelectronics, Inc. has not infringed and does not infringe the '633 Patent is necessary and appropriate at this time so that STMicorelectronics, Inc. can ascertain its rights and duties with respect to the '633 Patent. STMicorelectronics, Inc. has no adequate remedy at law.

137. Pursuant to the Federal Declaratory Judgment Act, 28 U.S.C. §§ 2201 *et seq.*, and Title 35 of the United States Code, STMicorelectronics, Inc. therefore requests a judicial declaration that it has not infringed, and does not infringe, any valid and enforceable claim of the '633 Patent, either directly or indirectly, individually or jointly, or literally or under the doctrine of equivalents.

138. STMicroelectronics, Inc. is entitled to further necessary or proper relief based on the Court's declaratory judgment or decree.

SECOND COUNTERCLAIM
(Declaration of Noninfringement of the '112 Patent)

139. STMicroelectronics, Inc. re-alleges and incorporates by reference the allegations set forth in paragraphs 125-131 of these Counterclaims.

140. Purdue claims that the '112 Patent was issued on October 11, 2011, by the PTO. Purdue claims ownership by assignment of the '112 Patent.

141. Purdue has alleged that STMicroelectronics, Inc. has infringed, and continues to infringe, the '112 Patent. An actual, immediate, and justiciable controversy exists between Purdue and STMicroelectronics, Inc. over the alleged infringement of the '112 Patent.

142. STMicroelectronics, Inc. has not infringed and does not infringe, directly or indirectly, willfully or otherwise, any valid and enforceable asserted claim of the '112 Patent, either literally or under the doctrine of equivalents.

143. A judicial declaration that STMicroelectronics, Inc. has not infringed and does not infringe the '112 Patent is necessary and appropriate at this time so that STMicroelectronics, Inc. can ascertain its rights and duties with respect to the '112 Patent. STMicroelectronics, Inc. has no adequate remedy at law.

144. Pursuant to the Federal Declaratory Judgment Act, 28 U.S.C. §§ 2201 *et seq.*, and Title 35 of the United States Code, STMicroelectronics, Inc. therefore requests a judicial declaration that it has not infringed, and does not infringe, any valid and enforceable claim of the '112 Patent, either directly or indirectly, individually or jointly, or literally or under the doctrine of equivalents.

145. STMicroelectronics, Inc. is entitled to further necessary or proper relief based on the Court's declaratory judgment or decree.

THIRD COUNTERCLAIM
(Declaration of Invalidity of the '633 Patent)

146. STMicroelectronics, Inc. re-alleges and incorporates by reference the allegations set forth in paragraphs 125-131 of these Counterclaims.

147. In its Complaint against STMicroelectronics, Inc., Purdue claims that the '633 Patent was duly and legally issued on March 3, 2009, by the PTO and purports to relate "to useful, novel, and non-obvious semiconductor devices for high-voltage power applications." Purdue claims ownership by assignment of the '633 Patent.

148. Purdue has alleged that STMicroelectronics, Inc. has infringed, and continues to infringe, the '633 Patent.

149. The asserted claims of the '633 Patent are invalid for failure to satisfy the conditions of patentability specified in 35 U.S.C. § 101 *et seq.*, including but not limited to 35 U.S.C. §§ 101, 102, 103, 112, and/or 116, the non-statutory doctrine of double patenting, incorrect inventorship, and the rules, regulations, and laws pertaining thereto. An actual, immediate, and justiciable controversy exists between Purdue and STMicroelectronics, Inc. over the alleged validity of the asserted claims of the '633 Patent.

150. A judicial declaration that the asserted claims of the '633 Patent are invalid because they fail to satisfy the conditions for patentability specified in Title 35 of the United States Code is necessary and appropriate at this time so that STMicroelectronics, Inc. can ascertain its rights and duties with respect to the asserted claims of the '633 Patent. STMicroelectronics, Inc. has no adequate remedy at law.

151. Pursuant to the Federal Declaratory Judgment Act, 28 U.S.C. §§ 2201 *et seq.*, and Title 35 of the United States Code, STMicroelectronics, Inc. therefore requests a judicial declaration that one or more claims of the '633 Patent are invalid and/or unenforceable at least because they fail to satisfy one or more conditions for patentability specified in 35 U.S.C. § 101 *et seq.*, including but not limited to 35 U.S.C. §§ 101, 102, 103, 112, and/or 116, the non-statutory doctrine of double patenting, incorrect inventorship, and the rules, regulations, and laws pertaining thereto., the non-statutory doctrine of double patenting, incorrect inventorship, and the rules, regulations, and laws pertaining thereto.

152. STMicroelectronics, Inc. is entitled to further necessary or proper relief based on the Court's declaratory judgment or decree.

FOURTH COUNTERCLAIM
(Declaration of Invalidity of the '112 Patent)

153. STMicroelectronics, Inc. re-alleges and incorporates by reference the allegations set forth in paragraphs 125-131 of these Counterclaims.

154. In its Complaint against STMicroelectronics, Inc., Purdue claims that the '112 Patent was duly and legally issued on October 11, 2011, by the PTO and purports to relate "to useful, novel, and non-obvious field effect transistors having self-aligned source contacts." Purdue claims ownership by assignment of the '112 Patent.

155. Purdue has alleged that STMicroelectronics, Inc. has infringed, and continues to infringe, the '112 Patent.

156. The asserted claims of the '112 Patent are invalid for failure to satisfy the conditions of patentability specified in 35 U.S.C. § 101 *et seq.*, including but not limited to 35 U.S.C. §§ 101, 102, 103, 112, and/or 116, the non-statutory doctrine of double patenting, incorrect inventorship, and the rules, regulations, and laws pertaining thereto. An actual,

immediate, and justiciable controversy exists between Purdue and STMicroelectronics, Inc. over the alleged validity of the asserted claims of the '112 Patent.

157. A judicial declaration that the asserted claims of the '112 Patent are invalid because they fail to satisfy the conditions for patentability specified in Title 35 of the United States Code is necessary and appropriate at this time so that STMicroelectronics, Inc. can ascertain its rights and duties with respect to the asserted claims of the '112 Patent. STMicroelectronics, Inc. has no adequate remedy at law.

158. Pursuant to the Federal Declaratory Judgment Act, 28 U.S.C. §§ 2201 *et seq.*, and Title 35 of the United States Code, STMicroelectronics, Inc. therefore requests a judicial declaration that one or more claims of the '112 Patent are invalid and/or unenforceable at least because they fail to satisfy one or more conditions for patentability specified in 35 U.S.C. § 101 *et seq.*, including but not limited to 35 U.S.C. §§ 101, 102, 103, 112, and/or 116, the non-statutory doctrine of double patenting, incorrect inventorship, and the rules, regulations, and laws pertaining thereto.

159. STMicroelectronics, Inc. is entitled to further necessary or proper relief based on the Court's declaratory judgment or decree.

DEMAND FOR JURY TRIAL

160. STMicroelectronics, Inc. requests a trial by jury on all issues so triable.

PRAYER FOR RELIEF

STMicroelectronics, Inc. respectfully requests that the Court:

1. enter judgment dismissing Purdue's claims against STMicroelectronics, Inc. with prejudice;
2. enter judgment denying each of Purdue's requests for relief;

3. enter judgment that STMicroelectronics, Inc. has not infringed and does not now infringe any valid and enforceable asserted claims of the '633 Patent;
4. enter judgment that STMicroelectronics, Inc. has not infringed and does not now infringe any valid and enforceable asserted claims of the '112 Patent;
5. enter judgment that the asserted claims of the '633 Patent are invalid and/or unenforceable;
6. enter judgment that the asserted claims of the '112 Patent are invalid and/or unenforceable;
7. find this to be an exceptional case as a result of Purdue's filing and litigation of this action under 35 U.S.C. § 285 and award STMicroelectronics, Inc. its attorneys' fees and costs; and
8. award STMicroelectronics, Inc. any other relief the Court deems appropriate and just under the circumstances.

Dated: October 11, 2021

Respectfully submitted:

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STMICROELECTRONICS N.V., AND

STMICROELECTRONICS, INC.

CERTIFICATE OF SERVICE

I certify that on October 11, 2021, the foregoing document was electronically filed with the Clerk of the Court using CM/ECF, which sent notice of the filing to all case participants.

/s/ Bruce S. Sostek

Bruce S. Sostek